

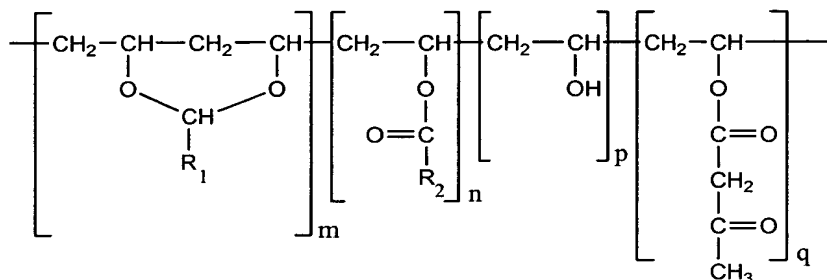
**CLAIMS**

What is claimed is:

1. A composition comprising:

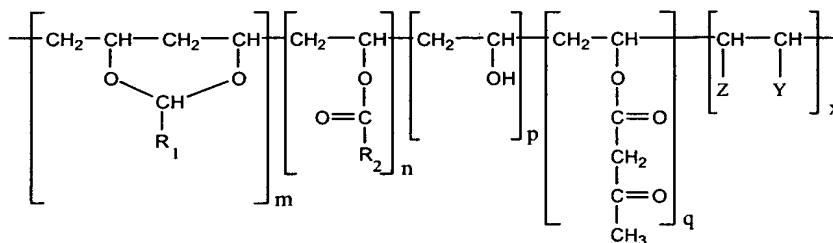
(a) an acetoacetylated polyvinyl polymer having the

5 formula:

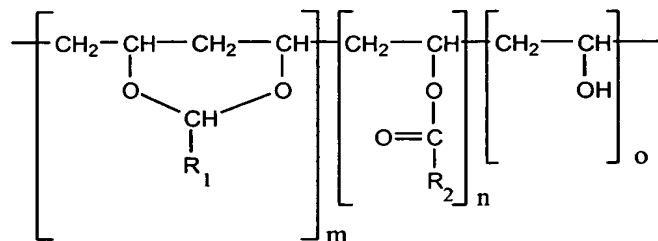


wherein (m) ranges from about 1.5 mole percent to about 85 mole percent, (n) ranges from about 0 mole percent to about 20.5 mole percent, (p) ranges from about 12 mole percent to about 87 mole percent and (q) ranges from about 1 mole percent to about 88 mole percent, sum of (m), (n), (p) and (q) being 100 and wherein R<sub>1</sub> and R<sub>2</sub> are independently H, substituted or unsubstituted C<sub>1</sub> to C<sub>12</sub> alkyl, substituted or unsubstituted C<sub>6</sub> to C<sub>14</sub> aryl, substituted or unsubstituted C<sub>7</sub> to C<sub>22</sub> aralkyl, substituted or unsubstituted C<sub>6</sub> to C<sub>14</sub> alkaryl, substituted, unsubstituted C<sub>4</sub> to C<sub>14</sub> carbocyclyl or a combination thereof, said substituents being independently selected from the group consisting of C<sub>1</sub> to C<sub>12</sub> alkoxy, acyl, carboxyl, derivative of carboxyl, sulfonyl, derivative of sulfonyl, cyano, and halo;

(b) an acetoacetylated polyvinyl polymer having the  
20 formula:

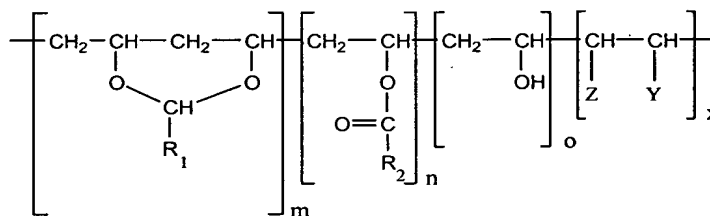


- wherein (m) ranges from about 1.5 mole percent to about 85 mole percent, (n) ranges from about 0 mole percent to about 20.5 mole percent, (p) ranges from about 12 mole percent to about 87 mole percent, (q) ranges from about 1 mole percent to about 88 mole percent and (x) ranges from about 0.5 to about 6 mole percent, sum of (m), (n), (p), (q) and (x) being 100 and wherein R<sub>1</sub> and R<sub>2</sub> are independently H, substituted or unsubstituted C<sub>1</sub> to C<sub>12</sub> alkyl, substituted or unsubstituted C<sub>6</sub> to C<sub>14</sub> aryl, substituted or unsubstituted C<sub>7</sub> to C<sub>22</sub> aralkyl, substituted or unsubstituted C<sub>6</sub> to C<sub>14</sub> alkaryl, substituted, unsubstituted C<sub>4</sub> to C<sub>14</sub> carbocyclyl or a combination thereof, and wherein Z is H, or –COOH and Y is –COOH, halo, unsubstituted phenyl or a combination thereof; said substituents being independently selected from the group consisting of C<sub>1</sub> to C<sub>12</sub> alkoxy, acyl, carboxyl, derivative of carboxyl, sulfonyl, derivative of sulfonyl, cyano, and halo; or
- (c) a combination thereof.
2. The coating composition of claim 1 wherein in said acetoacetylated polyvinyl polymer R<sub>1</sub> is propyl and R<sub>2</sub> is methyl.
3. The coating composition of claim 1 wherein GPC weight average molecular weight of said acetoacetylated polyvinyl polymer ranges from about 20,000 to about 300,000.
4. The coating composition of claim 1 wherein T<sub>g</sub> of the acetoacetylated polyvinyl polymer ranges from about 40°C to about 60°C.
5. The coating composition of claim 1 wherein said acetoacetylated polyvinyl polymer is solubilized in one or more solvents.
6. The coating composition of claim 1 wherein VOC of said composition ranges from 0.1 to 0.72 kilograms per liter of said composition.
7. The curable coating composition of claim 1 wherein said acetoacetylated polyvinyl polymer is produced by the steps comprising:
- (i) dissolving in one or more solvents:
- (a) a polyvinyl polymer having the formula:



- wherein (m) ranges from about 1.5 mole percent to about 85 mole percent, (n) ranges from about 0 mole percent to about 20.5 mole percent and (o) ranges from about 13 mole percent to about 98.5 mole percent, sum of (m), (n) and (o) being 100 and wherein R<sub>1</sub> and R<sub>2</sub> are independently H, substituted or unsubstituted C<sub>1</sub> to C<sub>12</sub> alkyl, substituted or unsubstituted C<sub>6</sub> to C<sub>14</sub> aryl, substituted or unsubstituted C<sub>7</sub> to C<sub>22</sub> aralkyl, substituted or unsubstituted C<sub>6</sub> to C<sub>14</sub> alkaryl, substituted, unsubstituted C<sub>4</sub> to C<sub>14</sub> carbocyclyl or a combination thereof, said substituents being independently selected from the group consisting of C<sub>1</sub> to C<sub>12</sub> alkoxy, acyl, carboxyl, derivative of carboxyl, sulfonyl, derivative of sulfonyl, cyano, and halo;

(b) a polyvinyl polymer having the formula:



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- wherein (m) ranges from about 1.5 mole percent to about 85 mole percent, (n) ranges from about 0 mole percent to about 20.5 mole percent and (o) ranges from about 13 mole percent to about 98.5 mole percent and (x) ranges from about 0.5 to about 6 mole percent, sum of (m), (n), (o) and (x) being 100 and wherein R<sub>1</sub> and R<sub>2</sub> are independently H, substituted or unsubstituted C<sub>1</sub> to C<sub>12</sub> alkyl, substituted or unsubstituted C<sub>6</sub> to C<sub>14</sub> aryl, substituted or unsubstituted C<sub>7</sub> to C<sub>22</sub> aralkyl, substituted or unsubstituted C<sub>6</sub> to C<sub>14</sub> alkaryl, substituted, unsubstituted C<sub>4</sub> to C<sub>14</sub> carbocyclyl or a combination thereof, and wherein Z is H, or -COOH and

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Y is  $-\text{COOH}$ , halo, unsubstituted phenyl or a combination thereof; said substituents being independently selected from the group consisting of  $\text{C}_1$  to  $\text{C}_{12}$  alkoxy, acyl, carboxyl, derivative of carboxyl, sulfonyl, derivative of sulfonyl, cyano, and halo; or

- 5 (c) a combination of thereof to form a solution;  
 (ii) contacting said solution with  $\text{C}_1$  to  $\text{C}_{12}$  alkyl acetoacetate to produce said acetoacetylated polyvinyl polymer.

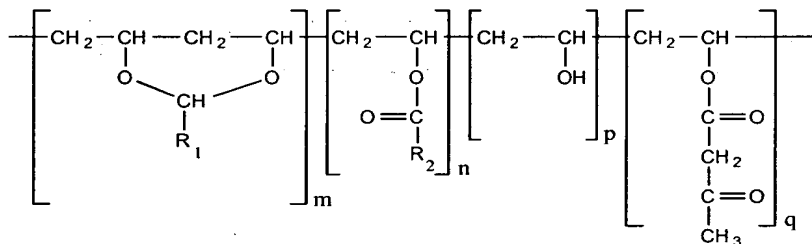
8. The composition of claim 7 wherein said  $\text{R}_1$  is propyl and said  $\text{R}_2$  is methyl.

- 10 9. The coating composition of claim 1 formulated as automotive refinish or OEM wash primer composition.

10. A method of producing a coating on a substrate comprising:

(i) applying a layer over a substrate surface of a coating composition comprising:

- 15 (a) an acetoacetylated polyvinyl polymer having the formula:

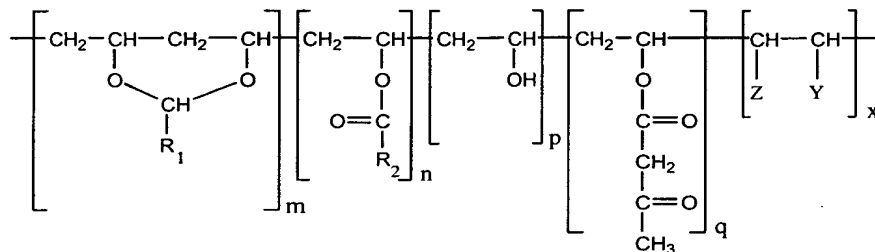


- wherein (m) ranges from about 1.5 mole percent to about 85 mole percent, (n) ranges from about 0 mole percent to about 20.5 mole percent, (p) ranges from about 12 mole percent to about 87 mole percent and (q) ranges from about 1 mole percent to about 88 mole percent, sum of (m), (n), (p) and (q) being 100 and wherein  $\text{R}_1$  and  $\text{R}_2$  are independently H, substituted or unsubstituted  $\text{C}_1$  to  $\text{C}_{12}$  alkyl, substituted or unsubstituted  $\text{C}_6$  to  $\text{C}_{14}$  aryl, substituted or unsubstituted  $\text{C}_7$  to  $\text{C}_{22}$  aralkyl, substituted or unsubstituted  $\text{C}_6$  to  $\text{C}_{14}$  alkaryl, substituted, unsubstituted  $\text{C}_4$  to  $\text{C}_{14}$  carbocyclyl or a combination thereof, said substituents being independently selected from the group consisting of  $\text{C}_1$  to  $\text{C}_{12}$  alkoxy, acyl,
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carboxyl, derivative of carboxyl, sulfonyl, derivative of sulfonyl, cyano, and halo;

(b) an acetoacetylated polyvinyl polymer having the formula:

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wherein (m) ranges from about 1.5 mole percent to 85 mole percent, (n) ranges from about 0 mole percent to 20.5 mole percent, (p) ranges from about 12 mole percent to about 87 mole percent, (q) ranges from about 1 mole percent to about 88 mole percent and (x) ranges from 0.5 to 6 mole percent, sum of (m), (n), (p), (q) and (x) being 100 and wherein R<sub>1</sub> and R<sub>2</sub> are independently H, substituted or unsubstituted C<sub>1</sub> to C<sub>12</sub> alkyl, substituted or unsubstituted C<sub>6</sub> to C<sub>14</sub> aryl, substituted or unsubstituted C<sub>7</sub> to C<sub>22</sub> aralkyl, substituted or unsubstituted C<sub>6</sub> to C<sub>14</sub> alkaryl, substituted, unsubstituted C<sub>4</sub> to C<sub>14</sub> carbocyclyl or a combination thereof, and wherein Z is H, or -COOH and Y is -COOH, halo, unsubstituted phenyl or a combination thereof; said substituents being independently selected from the group consisting of C<sub>1</sub> to C<sub>12</sub> alkoxy, acyl, carboxyl, derivative of carboxyl, sulfonyl, derivative of sulfonyl, cyano, and halo; or

(c) a combination thereof; and

(ii) drying said layer under ambient conditions or at elevated cure temperatures to form said coating on said substrate.

11. The method of claim 10 wherein said R<sub>1</sub> is propyl and said R<sub>2</sub> is methyl.

12. The method of claim 10 or 11 further comprising applying a layer of base coating composition on said layer before said drying step.

13. The method of claim 12 further comprising applying a layer of clear coating composition on said layer of base coating composition before said drying step.

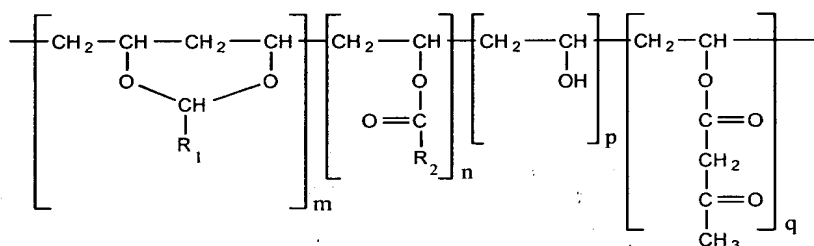
14. The method of claim 13 wherein said coating composition is a wash primer composition.

15. The method of claim 14 wherein said substrate is an automotive body.

16. A method of producing a multi-coat system on a substrate comprising:

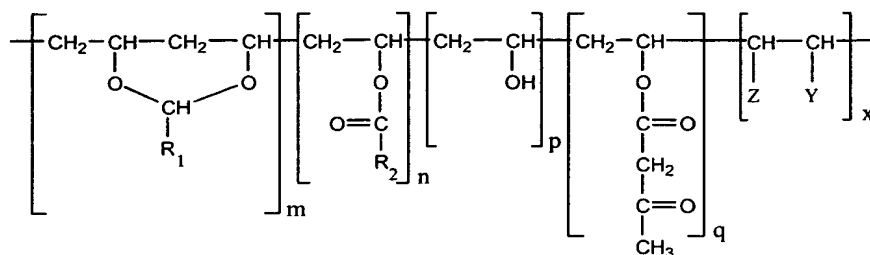
(i) applying a layer over a substrate surface of a coating composition comprising:

(a) an acetoacetylated polyvinyl polymer having the formula:



wherein (m) ranges from about 1.5 mole percent to about 85 mole percent, (n) ranges from about 0 mole percent to about 20.5 mole percent, (p) ranges from about 12 mole percent to about 87 mole percent and (q) ranges from about 1 mole percent to about 88 mole percent, sum of (m), (n), (p) and (q) being 100 and wherein R<sub>1</sub> and R<sub>2</sub> are independently H, substituted or unsubstituted C<sub>1</sub> to C<sub>12</sub> alkyl, substituted or unsubstituted C<sub>6</sub> to C<sub>14</sub> aryl, substituted or unsubstituted C<sub>7</sub> to C<sub>22</sub> aralkyl, substituted or unsubstituted C<sub>6</sub> to C<sub>14</sub> alkaryl, substituted, unsubstituted C<sub>4</sub> to C<sub>14</sub> carbocyclyl or a combination thereof, said substituents being independently selected from the group consisting of C<sub>1</sub> to C<sub>12</sub> alkoxy, acyl, carboxyl, derivative of carboxyl, sulfonyl, derivative of sulfonyl, cyano, and halo;

(b) an acetoacetylated polyvinyl polymer having the formula:



wherein (m) ranges from about 1.5 mole percent to 85 mole percent, (n) ranges from about 0 mole percent to 20.5 mole percent, (p) ranges from about 12 mole percent to about 87 mole percent, (q) ranges from about 1 mole percent to about 88 mole percent and (x) ranges from 0.5 to 6 mole percent, sum of (m), (n), (p), (q) and (x) being 100 and wherein R<sub>1</sub> and R<sub>2</sub> are independently H, substituted or unsubstituted C<sub>1</sub> to C<sub>12</sub> alkyl, substituted or unsubstituted C<sub>6</sub> to C<sub>14</sub> aryl, substituted or unsubstituted C<sub>7</sub> to C<sub>22</sub> aralkyl, substituted or unsubstituted C<sub>6</sub> to C<sub>14</sub> alkaryl, substituted, unsubstituted C<sub>4</sub> to C<sub>14</sub> carbocyclyl or a combination thereof, and wherein Z is H, or -COOH and Y is -COOH, halo, unsubstituted phenyl or a combination thereof; said substituents being independently selected from the group consisting of C<sub>1</sub> to C<sub>12</sub> alkoxy, acyl, carboxyl, derivative of carboxyl, sulfonyl, derivative of sulfonyl, cyano, and halo; or

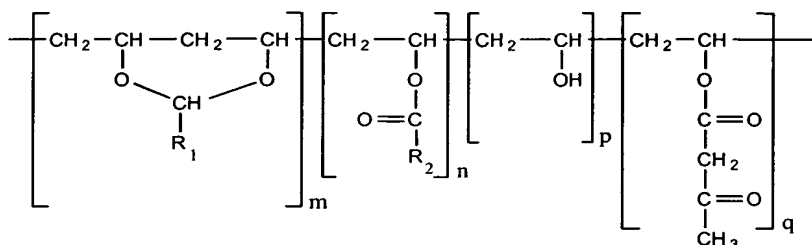
- (c) a combination thereof;
- (ii) applying a layer of a base coating composition on said composition layer;
- (iii) applying a layer of a clear coating composition on said layer of base coating composition to form a multi-layer system on said substrate; and
- (iv) drying said multi-layer system under ambient conditions or at elevated cure temperatures to form said multi-coat system on said substrate.

17. The method of claim 16 wherein said substrate is an automotive body.

18. A method of producing a molded article comprising:

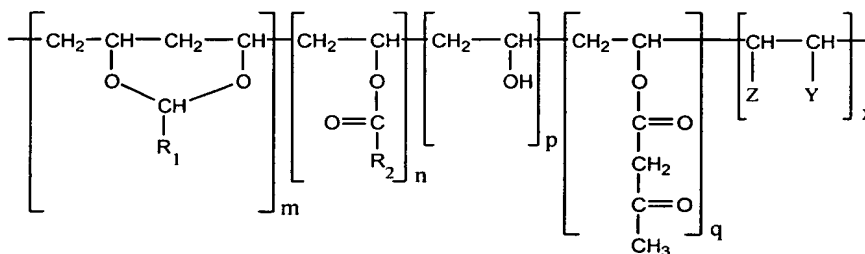
(i) mixing fibrils, floc, pulp, micropulp or a combination thereof with a composition to form a moldable component, said composition comprising:

- (a) an acetoacetylated polyvinyl polymer having the  
5 formula:



- wherein (m) ranges from about 1.5 mole percent to about 85 mole percent, (n) ranges from about 0 mole percent to about 20.5 mole percent, (p) ranges from about 12 mole percent to about 87 mole percent and (q) ranges from about 1 mole percent to about 88 mole percent, sum of (m), (n), (p) and (q) being 100 and wherein  $\text{R}_1$  and  $\text{R}_2$  are independently H, substituted or unsubstituted  $\text{C}_1$  to  $\text{C}_{12}$  alkyl, substituted or unsubstituted  $\text{C}_6$  to  $\text{C}_{14}$  aryl, substituted or unsubstituted  $\text{C}_7$  to  $\text{C}_{22}$  aralkyl, substituted or unsubstituted  $\text{C}_6$  to  $\text{C}_{14}$  alkaryl, substituted, unsubstituted  $\text{C}_4$  to  $\text{C}_{14}$  carbocyclyl or a combination thereof, said substituents being  
10 independently selected from the group consisting of  $\text{C}_1$  to  $\text{C}_{12}$  alkoxy, acyl, carboxyl, derivative of carboxyl, sulfonyl, derivative of sulfonyl, cyano, and halo;

- (b) an acetoacetylated polyvinyl polymer having the  
20 formula:





- wherein (m) ranges from about 1.5 mole percent to 85 mole percent, (n) ranges from about 0 mole percent to 20.5 mole percent, (p) ranges from about 12 mole percent to about 87 mole percent, (q) ranges from about 1 mole percent to about 88 mole percent and (x) ranges from 0.5 to 6 mole percent, sum of (m), (n), (p), (q) and (x) being 100 and wherein R<sub>1</sub> and R<sub>2</sub> are independently H, substituted or unsubstituted C<sub>1</sub> to C<sub>12</sub> alkyl, substituted or unsubstituted C<sub>6</sub> to C<sub>14</sub> aryl, substituted or unsubstituted C<sub>7</sub> to C<sub>22</sub> aralkyl, substituted or unsubstituted C<sub>6</sub> to C<sub>14</sub> alkaryl, substituted, unsubstituted C<sub>4</sub> to C<sub>14</sub> carbocyclyl or a combination thereof, and wherein Z is H, or –COOH and Y is –COOH, halo, unsubstituted phenyl or a combination thereof; said substituents being independently selected from the group consisting of C<sub>1</sub> to C<sub>12</sub> alkoxy, acyl, carboxyl, derivative of carboxyl, sulfonyl, derivative of sulfonyl, cyano, and halo; or
- (c) a combination thereof;
  - (ii) heating said moldable component into a melt;
  - (iii) conveying a desired amount of said melt into a cavity of an article mold;
  - (iv) cooling said desired amount of melt to form said article; and
  - (v) removing said article from said cavity.
19. The method of claim 18 wherein said molded article is a safety helmet.